Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in this application.

1-12. (Cancelled)

13. (New) A polarization-controlled encoder comprising:

a 2×2 3dB beam splitter for splitting one injected optical pulse into two optical pulses, and for recombining the two optical pulses subjected to at least one of delay and modulation into one optical output;

a delay line for delaying one of the two optical pulses;

a phase modulator for phase-modulating the optical pulse according to a quantum key distribution protocol; and

two 90 degree Faraday mirrors,

wherein a first port on a first side of the 2×2 3dB beam splitter is an output port of the polarization-controlled encoder, and a second port on the first side is an input port of the polarization-controlled encoder;

a first port on a second side of the 2×2 3dB beam splitter is connected to one of the two 90 degree Faraday mirrors, and a second port on the second side is connected to the other of the two 90 degree Faraday mirrors;

the delay line being connected between one port of the 2×2 3dB beam splitter and one of the two 90 degree Faraday mirrors; and

the phase modulator being connected between a port of the 2×2 3dB beam splitter and at least one of one of the two 90 degree Faraday mirrors and the output port of the polarization-controlled encoder.

14. (New) The polarization-controlled encoder according to claim 13, further comprising:

an optical circulator located at the output port of the polarization-controlled encoder, wherein light inputted into a first port of the optical circulator is outputted from a second port of the optical circulator, light inputted into the second port of the optical circulator is outputted from a third port of the optical circulator, the recombined optical output is inputted into the first port of the optical circulator and is outputted from the second port of the optical circulator.

15. (New) The polarization-controlled encoder according to claim 14, further comprising:

a detector connected to the third port of the optical circulator, the detector detecting return injected light from the second port of the optical circulator.

16. (New) The polarization-controlled encoder according to claim 14, further comprising:

an optical band-pass filter connected to the first port of the optical circulator, the original band-pass filter performing optical band-pass filtering on the recombined optical output.

17. (New) A quantum key distribution system comprising:

an optical pulse generator for generating optical pulses;

a transmitter comprising a polarization-controlled encoder having a 2×2 3dB beam splitter for splitting one injected optical pulse into two optical pulses, and for recombining the two optical pulses subjected to at least one of delay and modulation into one optical output; and two 90 degree Faraday mirrors, wherein a first port on a second side of the 2×2 3dB beam splitter is

connected to one of the two 90 degree Faraday mirrors, and a second port on the second side is connected to the other of the two 90 degree Faraday mirrors, the transmitter performing polarization-controlled encoding on the optical pulses generated by the optical pulse generator;

a quantum channel for transmitting the recombined optical output from the transmitter;

a receiver comprising a polarization-controlled encoder having a 2×2 3dB beam splitter for splitting one injected optical pulse into two optical pulses, and for recombining the two optical pulses subjected to at least one of delay and modulation into one optical output; and two 90 degree Faraday mirrors, wherein a first port on a second side of the 2×2 3dB beam splitter is connected to one of the two 90 degree Faraday mirrors, and a second port on the second side is connected to the other of the two 90 degree Faraday mirrors, the receiver decoding the recombined optical output originated from the transmitter and transmitted through the quantum channel according to the quantum key distribution protocol to generate two groups of optical pulses, each group of optical pulses being derived from one optical pulse transmitted by the transmitter; and

a single photon detector synchronously detecting a superposition interference of optical pulses which are respectively from the two groups of optical pulses, and distributing a quantum key according to the quantum key distribution protocol.

18. (New) The quantum key distribution system according to claim 17, wherein

if at the transmitter side, the phase modulator is connected to the output port of the polarization-controlled encoder, then at the receiver side, the phase modulator is connected to the input port of the polarization-controlled encoder.